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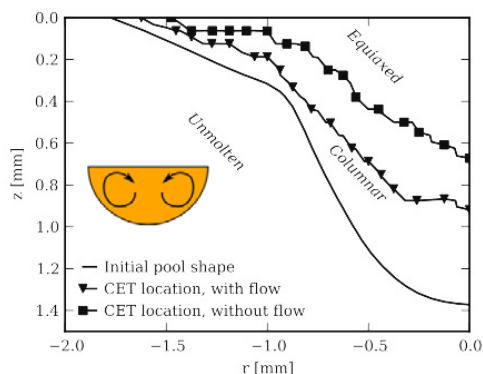
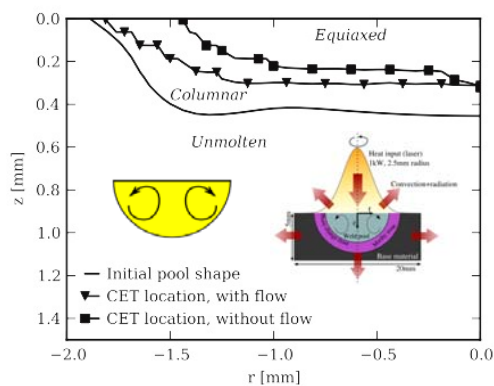
Research interests:

Welding physics. The influence of welding on high strength materials. Residual stress and distortion prediction and control. Fluid flow in molten metal melt pools.

## Welding

### Recent Research activities:

Fluid flow in weld pools affects energy transport, weld geometry and resultant microstructure.



Prediction of columnar to equiaxed transition in a weld pool with and without fluid flow with above (80 ppm) and below (200 ppm) sulphur [5].

The sulphur content influences the direction of fluid flow, driven by the temperature dependent surface tension gradient. The temporal evolution of this gradient, which for steel weld pools is also influenced by the dissolved oxygen concentration, is under investigation.

### Key publications:

- [1] Dutta, R.K.; Malet, L.; Gao, H.; Hermans, M.J.M.; Godet, S. and Richardson, I.M. 'Formation of Nanostructures in Severely Deformed High-Strength Steel Induced by High-Frequency Ultrasonic Impact Treatment', *Metall. Mater. Trans. A*, 46A(2), 813-830, 2015.
- [2] Dutta, R.K.; Petrov, R.H.; Hermans, M.J.M. and Richardson, I.M. 'Accommodation of Plastic Deformation by Ultrasound-Induced Grain Rotation', *Metall. Mater. Trans. A*, 46A(8), 3414-3422, 2015.
- [3] Amirthalingam, M.; van der Aa, E.M.; Kwakernaak, C.; Hermans, M.J.M. and Richardson, I.M. 'Elemental Segregation During Resistance Spot Welding of Boron Containing Advanced High Strength Steels', *Welding in the World* 59(5), 743-755, 2015.
- [4] Van der Aa, E.M.; Amirthalingam M.; Winter, J.; Hanlon, D.N.; Hermans, M.J.M.; Rijnders, M. and Richardson, I.M. 'Improved Resistance Spot Weldability of 3rd Generation AHSS for Automotive Applications' 11th International Seminar on Numerical Analysis of Weldability, Seggau, Graz, Austria, 27-30 September 2015. Winner Best Paper Award.
- [5] Kidess, A.; Tong, M.; Duggan, G.; Browne, D.J.; Kenjereš, S.; Richardson, I. and Kleijn, C.R. 'An Integrated Model for the Post-solidification Shape and Grain Morphology of Fusion Welds', *International Journal of Heat and Mass Transfer*, 85(6), 667-678, 2015.

### Other Achievements:

- [1] Editor in chief, *Welding in the World*
- [2] Co-founder Delft Offshore Technology Centre
- [3] Vice chair, IIW SG212, IIW, Commission XII.